

male is exposed during and immediately after sperm transference. When the two crabs separate, the abdomen of neither is in the tucked-in position. The *receptaculum seminalis* when dissected immediately after copulation contained sperms proving they were actually transferred.

Throughout this process the female is passive. If the female does not relax her abdomen the male faces her and forces her to release the abdomen from the tucked-in position.

*P. scabriuscula* appears to be peace-loving, for during a period of five years of frequent observation of this widely distributed species the author has not seen more than three instances of fights and this amongst males only. In every case, it was during the breeding season and for a mate. A fight for the seizure of food never occurred. One typical instance of the fight was when a male was attempting to seize a female for mating, and another male approached them. The first male immediately hooked the chelipeds and the first pair of walking legs of the female with its first pair of ambulatory legs paralysing her movements. In this state, he puts up a defensive fight with his chelae, using one of them for catching the wrist of one of the chelae of the opponent thereby disabling the latter from approaching the female already in his possession. This struggle between them lasted for quite a long time (not less than five minutes) during which period the female was not released at all. It was the intruding male that finally fled.

The second instance was almost similar to the above, while in the third case the intruder was much stronger and during the struggle the female escaped. The above instances are not common for, in general, a male with a female remains undisturbed.

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August 8, 1954.

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#### 42. SEX RATIO AND VARIABILITY OF APODOUS SEGMENTS IN *APUS* (PHYLLOPODA: CRUSTACEA)

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Males are generally known to be rare in *Apus*. This certainly appears to be the case in *Apus cancriformis*. Gurney, (1925) however, pointed out that in *A. orientalis* (which he referred to as *A. asiaticus*) males outnumbered the females in the collection that he examined. The author (Tiwari, 1952) also reached the same conclusion after examining a number of freshly collected examples of this species from Panchgani in the Bombay State. Recently Main (1953) has stated that in *A. australiensis* males are more abundant than are usually believed to be in *Apus*. He also pointed out the large variability in the number of apodous segments, a character that is greatly relied upon in the taxonomy of *Apus*.

In order to investigate whether males really outnumber the females in *A. orientalis*, and to examine the variability in the number of apodous segments, the author requested Mr. Humayun Abdulali to lend him the collection of this species preserved in the Bombay Natural History Society. A fine sample of 76 examples of this species was thus obtained, and the present note contains a result of the examination of this and other samples of *A. orientalis* and *A. cancriformis* present in the Zoological Survey of India.

SEX RATIO IN *A. orientalis* AND *A. cancriformis*

The number of males and females was ascertained from the following samples.

*Apus orientalis*

1. Panchgani, 74 specimens; Coll. Humayun Abdulali, 29-7-53, (Bombay Nat. Hist. Soc. coll.)
2. do , 6 specimens; Coll. E. Blatter, Date ? (Regd. No. C1527/1, Z.S.I.)
3. do , 16 specimens; Coll. S. L. Hora, Sept. 1924 : (Regd. No. C1264/1, Z.S.I.)
4. do , 13 specimens; (greenish variety); Coll. ?, 13th August, 1950. (Z.S.I.)
5. do , 11 specimens; (reddish variety) 13th August, 1950. (Z.S.I.)

*Apus cancriformis*

1. Jammu State, Kashmir, 30 specimens; Coll. Pandit Ram Dhan, Donor A. J. Grove, Esqr., Date ? (Z.S.I.).
2. Banihal Ilaka, south of the Pir Panjal Range, alt. 6,000 ft. 13 specimens, Donor ?, Date ? (Z.S.I.).
3. Same locality, 5 specimens; (Z.S.I.).
4. Shrinagar, 8 specimens; Coll. T. B. Fletcher, 6-7-1923. (Z.S.I.)
5. Gandarbal, Kashmir—paddy fields 8 miles from town, alt. 7,000 ft., 24 specimens; Coll. Kashmir Survey; 25-6-1921 (Regd. No. C1262/1, Z.S.I.).
6. Loc. etc. ? 21 specimens (Z.S.I.).

Thus, 120 examples of *A. orientalis* and 101 of *A. cancriformis* were examined. The following table gives the number of males and females of each species present in each sample.

TABLE I

Sample No.	<i>A. orientalis</i>			Sample No.	<i>A. cancriformis</i>		
	Number of Males	Females	Total		Number of Males	Females	Total
1	18	56	74	1	0	30	30
2	3	3	6	2	0	13	13
3	9	7	16	3	0	5	5
4	11	2	13	4	3	5	8
5	10	1	11	5	0	24	24
				6	0	21	21
	<hr/> 51	<hr/> 69	<hr/> 120		<hr/> 3	<hr/> 98	<hr/> 101

The above table reveals that whereas males do seem to be rare in *A. cancriformis*, they certainly are abundant in the Panchgani species. Taken samplewise, the first sample containing the largest number of individuals has the males and females roughly in the ratio of 1 to 3, a figure somewhat approximating to that given by Main for *A. australiensis*. In the other samples, however, the number of males is disproportionately higher. As the samples do not appear to be random no statistical inference can be derived from them beyond the fact that males are quite abundant in this species.

It was, however, noticed that the males were much larger in size than females, and in samples where males outnumbered the females the individuals were large-sized. Measurements of the median length of the carapace (measured between the median notch in the sulcus and the transverse groove behind the eyes) in a number of individuals yielded the following results:—

TABLE II

Size range in millimeters	Frequency		
	Males	Females	
5.0—6.9	0	11	11
7.0—8.9	7	29	36
9.0—10.9	13	12	25
11.0—12.9	14	6	20
13.0—14.9	4	0	4
	<hr/>	<hr/>	<hr/>
	38	58	96
	<hr/>	<hr/>	<hr/>

It is thus obvious that in the above material the males attained a larger size in comparison to females, and this probably may explain the apparent preponderance of males over females in some samples where the individuals are large in size. It is to be noted that Gurney's sample also contained more males than females, and more detailed investigations are necessary before the exact nature of the marked fluctuations of the sex-ratio in this species could be ascertained.

Work on the biology of this species by some conveniently placed naturalists will be welcome to determine (i) the sex-ratio in *A. orientalis*, (ii) whether there is any seasonal fluctuation in the number of males and females in the population of this species, and (iii) if males and females differ from each other in size and other characters. If any disparity in the sex-ratio of the populations of this species really exists, it will be worthwhile to investigate whether this is due to genetic factors or due to environmental causes like differential death rate, etc. The occurrence of parthenogenesis and existence of polyploid individuals as the causes of unequal sex-ratio can also not be ruled out.

#### VARIABILITY OF APODOUS SEGMENTS

The value of meristic characters in taxonomic studies has been well recognised. In *Apus* where reliable diagnostic features are few, the number of apodous segments is generally depended upon for taxonomic purposes (Barnard, 1931; Tiwari, 1952). As will be

apparent from Main's statistics of *A. australiensis* this feature is rather variable in the Australian form. In the Indian species the number of apodous segments is fairly constant and can be safely relied upon as a criterion for delimiting species.

An examination of 103 examples of *A. orientalis* and 99 specimens of *A. cancriformis* gives the following frequency distribution for the apodous segments.

TABLE III

No. of apodous segments	<i>Apus orientalis</i>			No. of apodous segments	<i>Apus cancriformis</i>		
	Males	Females	Total		Males	Females	Total
11	0	47	47	6	0	47	47
12	4	16	20	7	3	49	52
13	33	0	33				
14	3	0	3				
	40	63	103		3	96	99

Females, thus, have 11-12 apodous segments and males have 12-14 in *A. orientalis*, while in *A. cancriformis* the apodous segments are either 6 or 7 in number. This number agrees with the figures given by Gurney, except that the range for females will be 11-13, the last figure being rather rare. In *A. mavliensis* where males are not known at present the apodous segments in females vary from 8 to 10 although the last number occurs most frequently. It can, therefore, be concluded that for Indian species the number of apodous segments is a reliable taxonomic character in the present state of our knowledge of this genus.

ZOOLOGICAL SURVEY  
OF INDIA,  
CALCUTTA.

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#### 43. OCCURRENCE OF THE MANTIS *GONGYLUS GONGYLOIDES* LINN. IN JUNAGADH (SAURASHTRA)

*Gongylus gongyloides* Linn. belongs to the phylum Arthropoda, to the sub-class Orthoptera of the class Insecta and to the family Mantidae. In 1877 this insect was recorded in the Midnapur District of Bengal by Dr. Anderson (*Proc. Asiat. Soc. of Bengal*, 1877, p. 193) and was shown to the members of the Asiatic Society of Bengal.

A single solitary specimen of *Gongylus gongyloides* Linn. was first observed in the Bahauddin College compound in the month of October 1953. It was kept in the laboratory in the living state for